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मानक

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IS 8872-2-3 (1979): Variable Resistors, Part II: General Purpose, Section 3: Type VRG3C [LITD 5: Semiconductor and Other Electronic Components and Devices]



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“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

SPECIFICATION FOR VARIABLE RESISTORS

PART II GENERAL PURPOSE

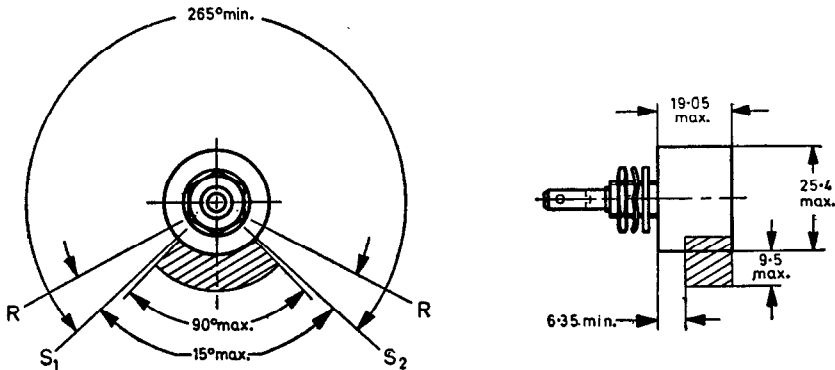
Section 3 Type VRG3C

0. **General** — This standard shall be read in conjunction with IS : 8872 ( Part I ) - 1977 ' Specification for variable resistors: Part I General requirements and methods of tests '.

1. **Scope** — This standard covers wire-wound general purpose variable resistors of rotary type required for commercial applications.

2. **Outline Drawing and Dimensions** — The outline drawing and dimensions of various styles shall be in accordance with Fig. 1 to 3 and Table 1.

2.1 Style VRG3C—1



All dimensions in millimetres.

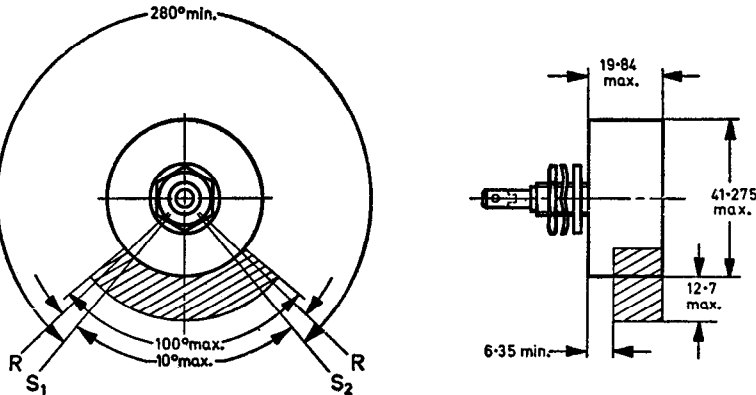
Note 1 — The three terminations shall be within the shaded portion.

Note 2 — The dotted line shows 15.88 mm spindle with end slot 1.4 to 1.65 mm wide, 1.4 to 1.65 mm deep.

Note 3 — The relation between the end stop position and the effective rotation is indicated by 'S' ( end stop ) and 'R' ( rotation ).

FIG. 1 OUTLINE DRAWING AND DIMENSIONS

2.2 Style VRG3C—2



All dimensions in millimetres.

Note 1 — The three terminations shall be within the shaded portion.

Note 2 — The dotted line shows 15.88 mm spindle with end slot 1.4 to 1.65 mm wide, 1.4 to 1.65 mm deep.

Note 3 — The relation between the end stop position and the effective rotation is indicated by 'S' ( end stop ) and 'R' ( rotation ).

FIG. 2 OUTLINE DRAWING AND DIMENSIONS

Adopted 3 October 1979

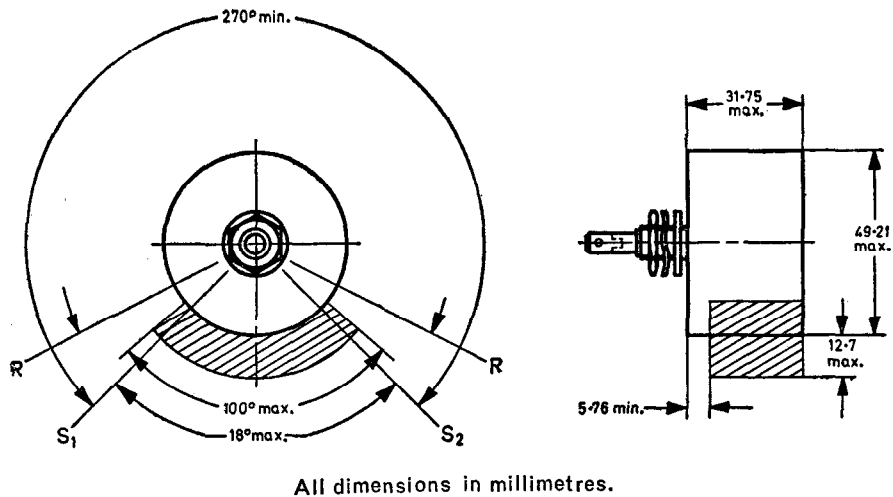
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Resistors Sectional Committee, LTDC 14 [ Ref: Doc: LTDC 14 (301) ]

2.3 Style VRG3C—5



All dimensions in millimetres.

**Note 1** — The three terminations shall be within the shaded portion.

**Note 2** — The dotted line shows 15.88 mm spindle with end slot 1.4 to 1.65 mm wide, 1.4 to 1.65 mm deep.

**Note 3** — The relation between the end stop position and the effective rotation is indicated by 'S' (end stop) and 'R' (rotation).

FIG. 3 OUTLINE DRAWING AND DIMENSIONS

TABLE 1 DIMENSIONS AND RATINGS  
( Clause 2 )

Style	Rated Dissipa- tion at 40°C	Maximum Working Voltage	Operating Torque	End Stop Torque ( Max )	Spindle Details		
					Diameter	Length ± 0.4	Type
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	W	V	m.Nm	Nm	mm	mm	
VRG3C—1A	1.0	250	7.062 — 35.31	0.565	6.35 + 0.03 — 0.05	15.88	Screwdriver slotted
VRG3C—1B	1.0	250	7.062 — 35.31	0.565	6.35 + 0.03 — 0.05	25.4	"
VRG3C—2A	2.0	400	7.062 — 70.62	1.13	6.35 + 0.03 — 0.05	15.88	"
VRG3C—2B	2.0	400	7.062 — 70.62	1.13	6.35 + 0.03 — 0.05	25.4	"
VRG3C—5A	5.0	500	7.062 — 70.62	1.13	6.35 + 0.03 — 0.05	15.88	"
VRG3C—5B	5.0	500	7.062 — 70.62	1.13	6.35 + 0.03 — 0.05	25.4	"

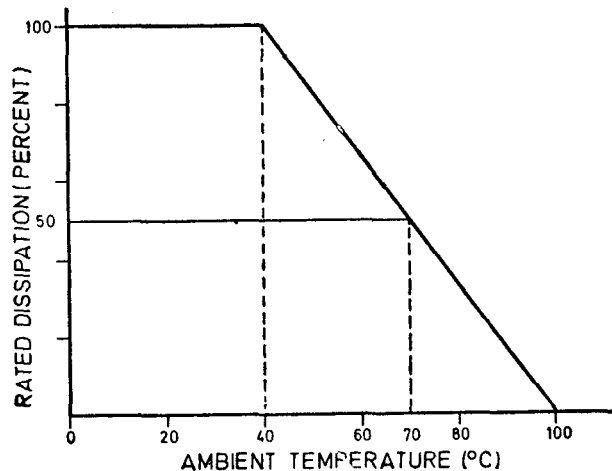
3. Ratings and Characteristics:

- |                               |                             |
|-------------------------------|-----------------------------|
| a) Electrical ratings         | See Table 1                 |
| b) Mechanical characteristics | See Fig. 1 to 3 and Table 1 |
| c) Selection tolerance        | ± 10 percent                |
| d) Stability                  | ± 10 percent                |
| e) Mechanical endurance       | 10 000 cycles               |
| f) Typical construction       | Wire-wound                  |
| g) Resistance law             | Law A, Linear               |

**4. IS : 589 Classification**

- |                         |                           |
|-------------------------|---------------------------|
| a) Temperature severity | 10/70                     |
| b) Damp heat severity   | 4 days                    |
| c) Bump                 | 4 000, 10 g               |
| d) Vibration            | 10 — 55 Hz, 10 g, 6 hours |

**5. Derating** — Variable resistors covered by this standard are derated linearly from 100 percent rated dissipation to zero dissipation at 100°C, through 50 percent dissipation at 70°C. The dissipation at temperatures lower than 40°C is the rated dissipation. Reference should be made to the curve shown below, to find out dissipation at other temperature.



**6. Marking** — See 6 of IS : 8872 ( Part I ) - 1977.

**7. Material, Construction and Workmanship** — See 5 of IS : 8872 ( Part I ) - 1977.

**8. Tests****8.1 Classification of Tests**

**8.1.1 Type tests** — The sequence of type tests and grouping of samples for type approval shall be in accordance with Table 2.

**8.1.1.1 Number of samples** — The manufacturer shall submit for each rated dissipation, the number of samples as given below:

Highest value	15*
Middle value	15*
Lowest value	15*

**8.1.1.2 Criteria for approval** — There shall be no single failure in any of the type tests.

**8.1.2 Routine tests** — The following tests shall be carried out on each and every variable resistor:

- Visual examination,
- Electrical continuity,
- Total resistance, and
- Sealing ( if required ).

**8.1.2.1** If during routine tests, more than 10 percent of the lot fails, the entire lot may be rejected.

\*Out of these 15 samples, 13 are required for carrying out type tests and 2 are to be kept as spare.

TABLE 2 TYPE TESTS

( Clause 8.1.1 )

Group	Title of Test	Number of Samples			Clause Ref in IS : 8872 (Part I)- 1977
		Highest Value (3)	Middle Value (4)	Lowest Value (5)	
(1)	(2)	(3)	(4)	(5)	(6)
0	Visual examination				9.1
	Dimensions				9.1.1
	Weight				—
	Electrical continuity				8.1
	Total resistance				8.2
	Minimum effective resistance and angle of ineffective rotation				8.5
	Effective resistance and angle of effective rotation	15	15	15	8.6
	Resistance law				8.7
	Voltage proof ( one minute )				8.9
	Insulation resistance				8.10
	Operating torque				9.2
1	End-stop torque				9.4
	Sealing				11.5
	Solderability				9.8.3
	Robustness of terminations				9.7
	Bump	4	4	4	9.10
2	Vibration				9.9
	Climatic				10.1
3	Damp heat ( long term )	2	2	2	10.2
4	Thrust and pull on spindle	2	2	2	9.6
5	Endurance ( mechanical )	2	2	2	11.3
	Endurance ( electrical )				11.4
6	Resistance to solvents	1	1	1	10.3
	Resistance to soldering heat				11.1
7	Salt mist	2	2	2	9.8.4
Spare		2	2	2	—

**8.1.3 Acceptance tests** — For the purpose of the acceptance of the lot, all the resistors shall be subjected to the tests as given in 8.1.2. Following this, two groups of samples ( Group A and B ) shall be selected and the resistors shall be subjected to the tests specified in Table 3 in the given order.

**8.2 General Condition for Tests** — See 7 of IS : 8872 (Part I)-1977. The same measuring set shall be used for any one test but not necessarily for all tests.

**8.2.1** The test schedule with test condition and requirements after each test, applicable to the variable resistors covered by this standard, shall be in accordance with Table 4.

TABLE 3 ACCEPTANCE TESTS

( Clause 8.1.3 )

SI No.	Test	Clause Ref in IS: 8872 ( Part I )-1977	AQL ( Percent Defective )	Inspection* Level	D/ND
(1)	(2)	(3)	(4)	(5)	(6)
1. GROUP A			1 percent	II	
	a) Dimensions	9.1			
	b) Resistance law	8.7			
	c) Voltage proof ( 2 second duration )	8.9			
	d) Operating torque	9.2			
2. GROUP B					
	Sub-group B1		4 percent	S3	ND
	a) Solderability	9.8.3			
	Sub-group B2		4 percent	S3	D
	a) Resistance to soldering heat	9.8.4			
	b) Robustness of terminations	9.7			
	c) Mechanical endurance	11.3			
	d) End stop torque	9.4			
	Sub-group B3		4 percent	S3	D
	a) Bump	9.10			
	b) Climatic	10.1			
	Sub-group B4		4 percent	S3	N
	a) Electrical endurance ( 168 h )	11.4			

D = Destructive      ND = Non-destructive

**Note 1** — Samples subjected to destructive tests and those having failed in non-destructive tests shall not be returned to the lot.

**Note 2** — For each group/sub-group, separate samples shall be drawn.

\*Indian Standard Sampling plans and procedures for inspection by attributes for electronic items.



TABLE 4 TEST SCHEDULE AND REQUIREMENTS

( Clause 8.2.1 )

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
I) All Samples				
a)	Visual examination	9.1	—	The workmanship and finish shall be satisfactory. The marking shall be legible
b)	Dimensions	9.1.1	—	The dimensions of the resistors and their terminations shall conform to values given in Table 1 and Fig. 1 to 3
c)	Electrical continuity	8.1	—	There shall be no electrical discontinuity
d)	Total resistance	8.2	—	The resistance value at 25°C shall correspond with the rated resistance taking into account the tolerance
e)	Minimum effective resistance and angle of ineffective rotation	8.5	—	The value of minimum effective resistance shall be not greater than 3 percent of the total resistance. Angle of ineffective rotation shall not exceed that given in Fig. 1 to 3
f)	Effective resistance and angle of effective rotation	8.6	—	Angle of effective rotation shall not exceed that given in Fig. 1 to 3
g)	Resistance law	8.7	—	—
h)	Voltage proof	8.9	i) $100 \pm 15$ Vdc for resistors with working voltage of 350 V ii) $500 \pm 50$ Vdc for resistors with working voltage greater than 350 V	There shall be no breakdown or flashover
j)	Insulation resistance	8.10	A voltage of rms of two times the maximum working voltage shall be applied	1 000M $\Omega$ , Min
k)	Operating torque	9.2	—	As in Table 1
m)	End stop torque	9.4	—	As in Table 1
n)	Sealing ( if required )	11.5	—	—
II) First Group				
a)	Solderability	9.8.3	—	—
b)	Robustness of terminations	9.7	—	—
1)	Visual examination	9.1	—	There shall be no damage
c)	Bump	9.10	4 000, 10 g	—
1)	Visual examination	9.1	—	There shall be no damage

( Continued )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	2) Electrical continuity	8.1	—	There shall be no electrical discontinuity
	3) Total resistance	8.2	—	The change in resistance value shall not exceed
d) Vibration		9.9	10-55 Hz, 10 g, 6 h	—
	1) Visual examination	9.1	—	There shall be no damage
	2) Electrical continuity	8.1	—	There shall be no electrical discontinuity
	3) Total resistance	8.2	—	The change in resistance value shall not exceed $\pm 2$ percent
e) Climatic sequence		10.1	—	—
	1) Dry heat	10.1.2	At maximum category (temperature $\pm 70^{\circ}\text{C}$ )	—
	2) Damp heat ( accelerated ) first cycle	10.1.3	One cycle	—
	i) Visual examination	9.1	—	There shall be no damage
	3) Cold	10.1.4	At minimum category temperature ( $-10^{\circ}\text{C}$ )	—
III) <i>Second Group</i>				
a) Damp heat ( long term )		10.2	—	—
	1) Visual examination	9.1	—	There shall be no damage
	2) Electrical continuity	8.1	—	There shall be no electrical discontinuity
	3) Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
	4) Insulation resistance	8.10	—	10 M $\Omega$ , <i>Min</i>
	5) Operating torque	9.2	—	As in Group 0
	6) Voltage proof	8.9	—	There shall be no breakdown or flashover
IV) <i>Third Group</i>				
a) Thrust and pull on the spindle		9.6	—	—
	1) Visual examination	9.1	—	There shall be no damage
b) Mechanical endurance		11.3	—	—
	1) Visual examination	9.1	—	There shall be no damage
	2) Electrical continuity	8.1	—	There shall be no electrical discontinuity
	3) Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
	4) Resistance law	8.7	—	—
	5) Insulation resistance	8.10	—	1 000 M $\Omega$ , <i>Min</i>
	6) Operating torque	9.2	—	As in Group 0

( Continued )

TABLE 4 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	7) Voltage proof	8.9	—	There shall be no breakdown or flashover
	8) Sealing ( if required )	11.5	—	—
V) <i>Fourth Group</i>				
a)	Electrical endurance	11.4	—	—
1)	Visual examination	9.1	—	There shall be no damage
2)	Electrical continuity	8.1	—	There shall be no electrical dis-continuity
3)	Total resistance	8.2	—	Change in resistance value shall not exceed $\pm 5$ percent
4)	Insulation resistance	8.10	—	1 000 M $\Omega$ , <i>Min</i>
5)	Voltage proof	8.9	—	There shall be no breakdown or flashover
6)	Sealing ( if required )	11.5	—	—
VI) <i>Fifth Group</i>				
a)	Resistance to solvents	11.1	—	—
b)	Resistance to soldering heat	9.8.4	—	—
VII) <i>Sixth Group</i>				
a)	Salt mist	10.3	—	—
1)	Visual examination	9.1	—	There shall be no damage
2)	Electrical continuity	8.1	—	There shall be no electrical dis-continuity
3)	Total resistance	8.2	—	As in Group 0
4)	Insulation resistance	8.10	—	1 000 M $\Omega$ , <i>Min</i>
5)	Operating torque	9.2	—	As in Group 0